DOING CONCEPTUAL MAPS: A MEANINGFUL STRATEGY TO UNDERSTAND ACADEMIC TEXTS[1]

ELABORAR MAPAS CONCEPTUALES: UNA ESTRATEGIA SIGNIFICATIVA PARA COMPRENDER TEXTOS ACADÉMICOS

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ABSTRACT

This paper is based on the document presented in the Hawaii International Conference on Education. It is a classroom research experience from the Arts and Humanities Faculty at the University of Caldas-Colombia with a group of 30 participants. The aim of the activities reported here was to assess the pedagogical effectiveness of conceptual maps in higher education teaching. The starting question was: How can mind maps help teachers to understand academic texts? The experience has been addressed in our university under construction of a pedagogical environment on the basis of human development.

Keywords: Conceptual maps, reading comprehension, academic texts, human brain learning in higher education.

RESUMEN

Este documento se basa en el trabajo presentado en Hawai en la Conferencia Internacional sobre la Educación. Se trata de una experiencia de investigación en el aula de la Facultad de Artes y Humanidades de la Universidad de Caldas-Colombia con un grupo de 30 participantes. El objetivo de las actividades fue evaluar la eficacia pedagógica de los mapas conceptuales en la enseñanza de la educación superior. La pregunta inicial era: ¿Cómo pueden los mapas conceptuales ayudar a los maestros a comprender los textos académicos? La experiencia ha sido abordada en nuestra Universidad en la construcción de un entorno pedagógico sobre la base del desarrollo humano.

Palabras clave: mapas conceptuales, comprensión de lectura, textos académicos, el cerebro humano de aprendizaje en la educación superior.

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DESCRIPTION OF THE PROBLEM

In our Colombian educational context, it is generally desirable that the pedagogical process be bound not to accumulate big quantities of knowledge but to build up this knowledge based on a learner's understanding of meaningful concepts. The starting point with which our experience began was related specifically to the improvement of the reading comprehension ability in a higher educational seminar in Manizales city and the implementation of strategies in order to understand academic texts by using conceptual maps.

Teachers in all over the world need a supporting strategy to work or learn both collaboratively and effectively. The volume and complexity of the material university teachers and students have to read increases every day, and along with it the volume and complexity of note-taking. Teachers want their students to understand and remember what they have been taught. However teachers and students are not aware of how the brain works while it is learning.

The initial concern which emerged from experience had to deal specifically with the lack of ability in higher education students and teachers to read comprehensibly. Different problems arise among teachers and students when they face the teaching-learning process. On one hand, teachers are constantly complaining about not only the lack of motivation in students to read and to comprehend academic texts, but also their lack of vocabulary. On the other hand, teachers are constantly criticized due to the lack of effective methods in order to help students to develop this ability.

Concerning higher education students, they argued that teachers do not encourage them to exploit this ability and that the reading activities are not designed and applied according to their interests, necessities, aims and individual expectations. Students are constantly complaining about the mechanistic activities they develop in their classes which generate little motivation, but also teachers argue about the lack of interest in reading by the students. The fact that teachers and students do not have the enough information about the way the human brain works, it was also noticeable; as a consequence, teachers and students do not know how to develop their innate capabilities in a better way. For these reasons, the reading comprehension process is not an effective and appealing way to learning.

INQUIRIES, QUESTIONS, AND CONCERNS

The following questions stated the point of departure in which it was intended to apply some kind of strategies which promote, among teachers, the possibility to improve their reading understanding taking advantage of the use of conceptual maps:

Is it possible to teach students how to improve their reading comprehension ability? Are conceptual maps effective strategies to help students and teachers to read comprehensibly? Is it possible to implement conceptual mapping strategies in order to help teachers and students to improve this ability? ¿How do university teachers handle conceptual maps in the classroom? ¿What are the effects of the conceptual maps? ¿What are the changes, goals and improvements observed on teachers' and student's reading comprehension of academic texts while doing conceptual maps?

OBJECTIVES

- To put into practice the techniques underlying conceptual maps, guided to the improvement of the reading comprehension ability.
- To present an approach of organizing content using conceptual maps.
- To improve the reading comprehension ability among a group of professors at the University of Caldas-Colombia based on the use of conceptual maps in order to get a more effective and significant learning.
- To develop conceptual maps strategies in order to help teachers and students to develop reading comprehension skills.
- To encourage teachers and students to take advantage of the use of conceptual maps as a meaningful and creative way to obtain the main information from academic texts.
- To exercise teachers and students' minds through conceptual maps in which they could canalize their comprehension ability.

CONCEPTUAL MAPS

For the development of this theoretical framework we took into account different authors according to our specific needs. In this case we will apply Ausubel (1968), No-

vak (1998), and Buzan (1988), Wallace and Mintzes (1990) because these authors had proposed theories focused on conceptual maps as artifacts for organizing and representing knowledge. In general terms, conceptual maps are tools not only to understand texts, but also to create knowledge and collaborative environments.

Let's check a brief review of theories that support our experience:

Although these currents have a common point of departure, they do not project toward the same destination. The differences among them are obvious:

Novak (1998) states that conceptual maps are graphic representations or diagrams that indicate relationships between concepts linked by words. They are also used to assist the hierarchical arranging and sequencing of teaching contents offering adequate stimulus to the learners.

Ausubel's work and theory on significant learning were used concerning the pedagogical aspects to be considered in adult user training. According to Ausubel (1968), the concepts and their hierarchical relationships should be identified, pointed out similarities and differences profiting by the natural sequence among topics. Ausubel (1968), emphasizes the Significant Learning as the process through which new information relates to a relevant aspect of the existing knowledge structure of an individual. (http://cmap.ihmc.us http://www.ihmc.us).

Trombetta et al (http://math.unipa.it/~grim/Jazzali.PDF) state that the conceptual map is a scheme contrived to represent the knowledge that a person (or a group) has about a given concept, in terms of its properties and relationships with other concepts.

The following ideas are taken from http://en.wikipedia.org/wiki/Cognitive_map:

Concept mapping is a technique for visualizing the relations between concepts. Its purpose is to form or assess a person's cognitive map. A concept map is a diagram showing the relationships between concepts. Concepts, like "tree" or "plant", are connected with labeled arrows, for example ("is-a", "related-to" or "part of"). The addition of labeled and flexible links (attached during or after construction) has been found to significantly improve the level of meaningful learning and communication of the concept mapper.

Cognitive Maps, Mental Maps, Mind Maps, Cognitive Models, or Mental Models are a type of mental processing, or cognition, composed of a series of psychological transformations by which an individual can acquire, code, store, recall, and decode information about the relative locations and attributes of phenomena in their everyday or metaphorical spatial environment. Here, 'cognition' can be used to refer to the mental models, or belief systems, that people use to perceive, contextualize, simplify, and make sense of otherwise complex problems. As they have been studied in various fields of science, these mental models are often referred to, variously, as cognitive maps, scripts, schema, and frames of reference.

After reviewing literature concerning concept maps we can summarize that this tool is widely used in education for:

- Learning to learn strategies
- Note taking and summarizing during the class session
- Preparing academic reports, presentations and dissertations
- Optimizing time lecturing and communicating complex ideas and arguments
- Knowledge elicitation and capturing
- Collaborative knowledge modeling and the transfer of expert knowledge
- Determining collaborative understanding within the classroom
- Designing didactic materials
- Training, assessment and evaluation
- Enhancing meaningful learning skills
- Integrating memory techniques.
- Fostering the potential of memory and other thinking skills.
- Developing multiple intelligences
- Increasing metacognition (learning to learn)
- Enhancing language ability, memory, thinking, retention or knowledge
- preservation
- Improving reading comprehension abilities
- Representing relations between concepts in the form of propositions
- Using human mind with maximum potential

A CONCEPTUAL MAP IS A NATURAL EXPRESSION OF THE BRAIN

Which group of living organisms are the best at reflecting, memorizing, understanding and learning? Of course, the human beings are. Because they have better brains, but moreover because they are still using their brains in the way they were designed to be used for.

Nowadays, scientists argue that the human mind has an infinite potential and capacity and that individuals only use a small part of this potential. The question is: How we, as teachers, can improve the students' mind's capacities?

Philosophers argue that problems and ideas do not germinate in barren brains. According to Campbell (1974:413) in the process of evolution, "at no stage has there been any transfusion of knowledge from the outside, nor of mechanisms of knowing, nor of fundamental certainties". Science, learning, thought and language germinate in active minds enriched by varied experiences. Knowledge is created by curious minds. Therefore, doing conceptual maps is a natural expression of the brain and it requires creative thought. For this reason, doing conceptual maps is neither a step by step process that one can master by following directions as in a handbook or manual. It is nor a long list of rigid cues that teaches us ´how to do it´.

Human beings are always processing information and solving problems. During the learning process, something puzzles or disturbs the learner's mind. In the field of education, the teacher as a knower will be able to recognize relationships, hierarchies, conceptual nets and internets. His alert mind, sensitively studying academic texts, can discover meaningful information. Fruitful ideas flow when he is trying to put new and complex thoughts into some meaningful order. Wonderful ideas also flow unexpectedly while the teacher, as an interpreter is talking with friends, listening to a lecture, teaching a class, reading a book, or relaxing.

The teaching-learning process and the reading comprehension abilities are concerned with the processes of inquiry (Muñoz, Quintero, and Munévar, 2002). A few years ago, writing a scholarly paper and taking an elementary grammar course was the only experience that many readers received. In today's oriented world, a world of revolutionary breakthroughs in science, cognition and technology, universities must train the new generation of teachers and professionals.

The process of thinking, the process of knowledge creation and constant review of one's knowledge is applicable to the mapping exercise in the formal education system, as well as to the active, creative, rational, emotional, intentional and permanent construction of the real world in everyday life. It is very important to know which part of the brain is involved in the process of doing conceptual maps. Today, psychologists are being profoundly interested in the relationship of the brain to the body, and they have taken the art of thinking to new horizons. They had developed basic lists of intellectual activities and propounded the basic principles of human thinking, imagination, and association that are so central to the human brain power. Thus, allowing the brain more time to focus on its own internal processes and creativity.

According to Buzán (1988), the theory of thought states that every single thought you have is multi-ordinated, meaning that every thought, be it a word, an image, a number, a smell, a taste or a colour etc. This theory emphasizes that all knowledge is a giant map of associative networks, containing billions of sub-maps each emanating from its own special-subject center.

One of the most outstanding scientific discoveries corresponded to Psychobiologist Roger Sperry (Nobel prize in 1981) and has to do with the brain and its specialized functions. Sperry discovered that human beings are of two minds. He found that the human brain has specialized functions on the right and left sides or hemispheres, and that the two sides can operate practically in an independent way. Sperry discovered that both sides of the brain develop different mind activities. Sperry had confirmed that the evolutionarily latest part of the brain, the 'thinking cap' of the Cerebral Cortex, was divided into two major hemispheres, and that those hemispheres performed a comprehensive range of intellectual tasks.

The tasks included the following: logic, lines, numbers, words, lists, rhythm, colour, daydreaming and imagination. Wernicke's and Broca's area are two brain parts that control

speech comprehension-vocabulary and speech production-grammar. These abilities are not absolute, but it seems that the left hemisphere is specialized in language processes and the right is dominant in visual-construction tasks.

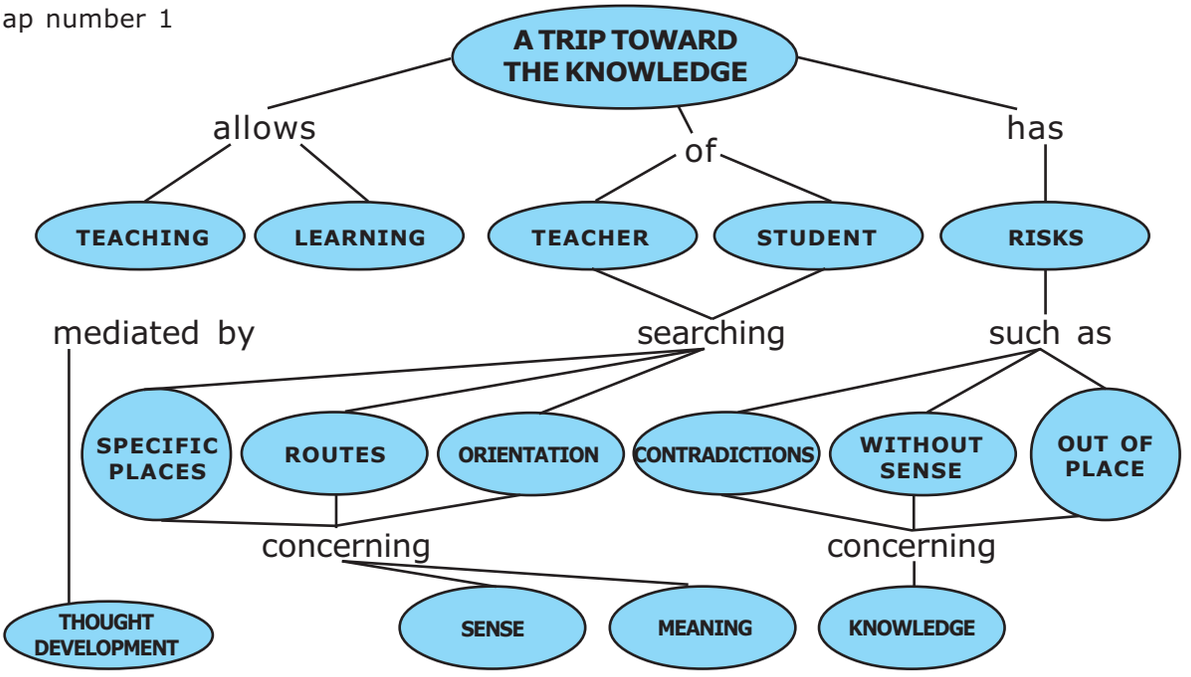
Sperry's work helped chart a map of the brain and opened whole fields of psychological and philosophical questions. Research brain findings can be seen in the following illustration:

RIGHT HEMISPHERE	LEFT HEMISPHERE
Rhythm	Language
Music	Logic
Images	Numbers
Imagination	Sequential order
Color	Analysis
Dimension	linearity
Diurnal reverie	

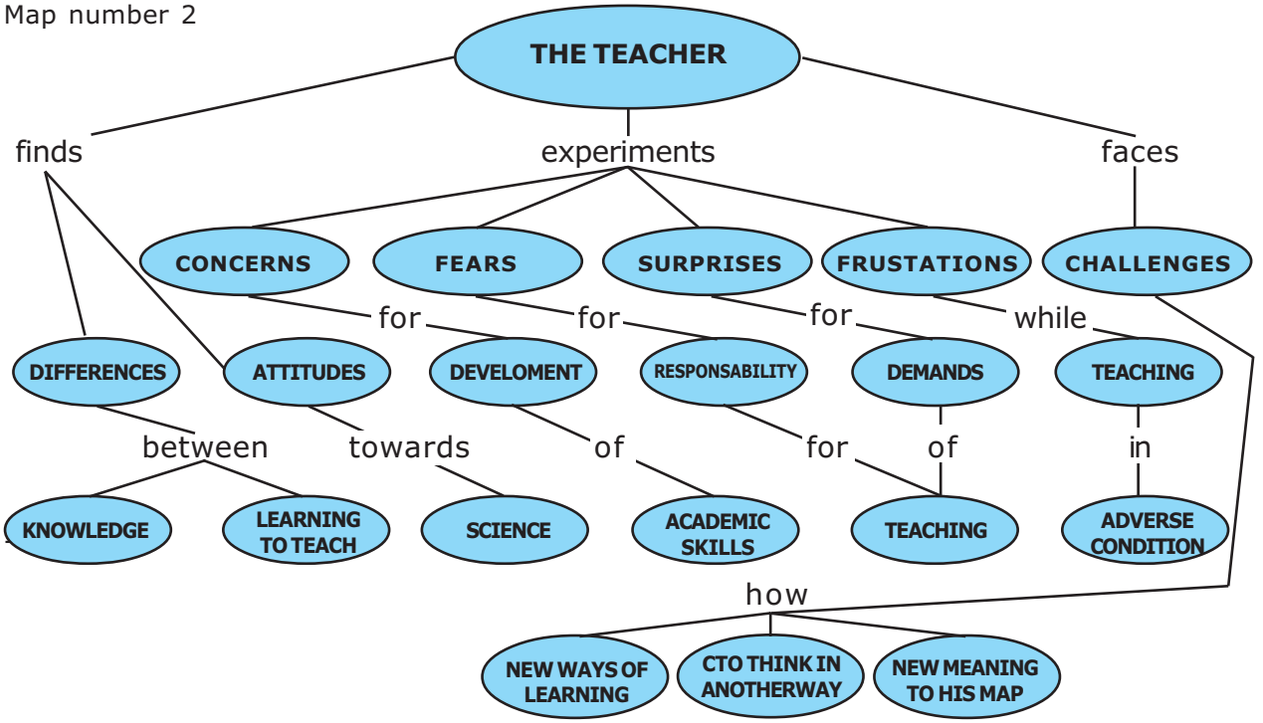
Within most people, the left side of the brain has to do with logic, language, reasoning numbers, analysis; it means, with the so called scientific activities. When the left side is in activity, the right side is in rest (repose) the right side develops activities such as the rhythm, images, imagination, colors, recognition of faces, models and maps. It doesn't mean that we cannot use both sides, on the contrary, the more you use your whole brain, the more you can develop your capacities. Then, it is possible to develop that side of our brain that has been resting and for the same reason, to have a bigger potential.
In our specific case, the development of the reading comprehension ability on academic texts has a close relationship with the use of both sides of the brain; we will need communication activities, taking notes, memorization, in all of these fields you will require to use both sides of the brain. Sperry's own research and that of the vast array of researchers confirmed that the more these activities are integrated, the more the brain's performance becomes synergetic.

When readers are mapping, they are not only practicing and exercising their fundamental memory powers and their information processing, networking and organizing of data; they are also using the entire range of their cortical skills. These maps were used at first to set up the texts' path and then in the actual teaching sessions, in order to frame the topics taught, introducing analog concepts and assessing the effectiveness of learning, as shown in the following examples:

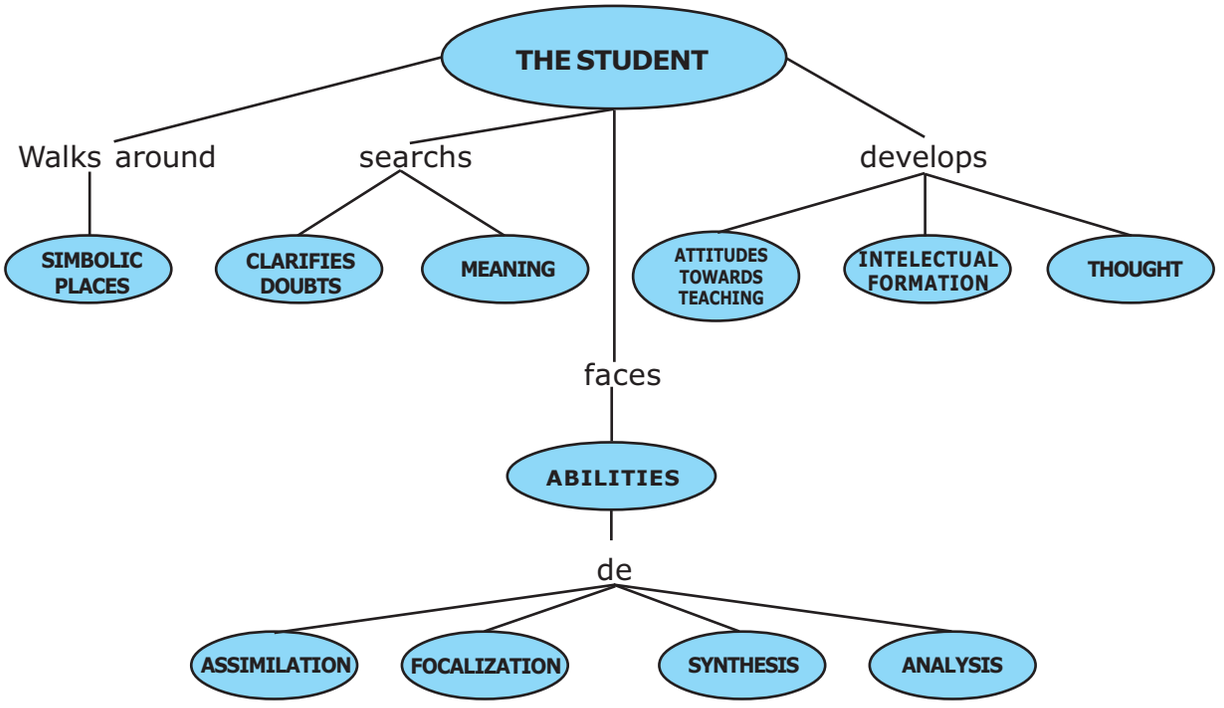
Map number 1



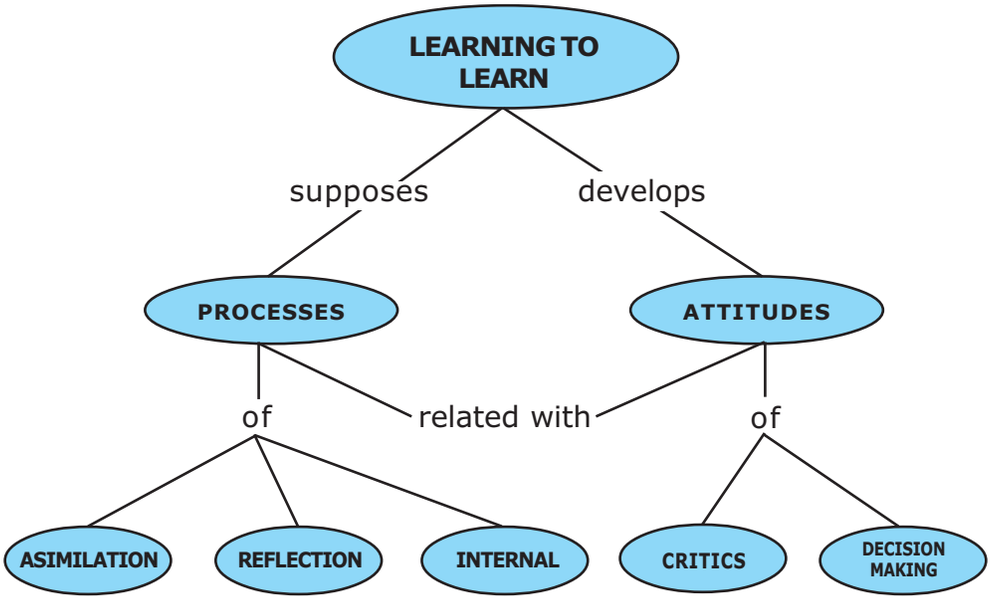
Map number 2



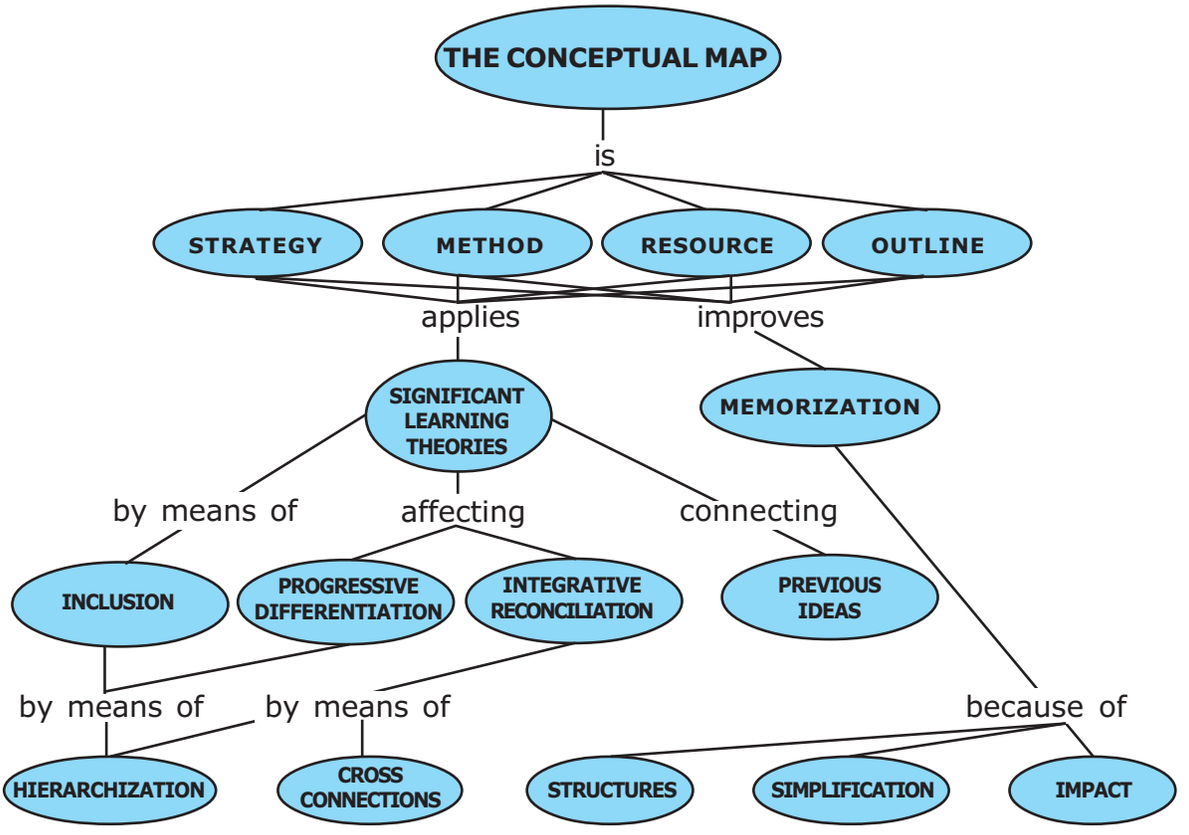
Map number 3



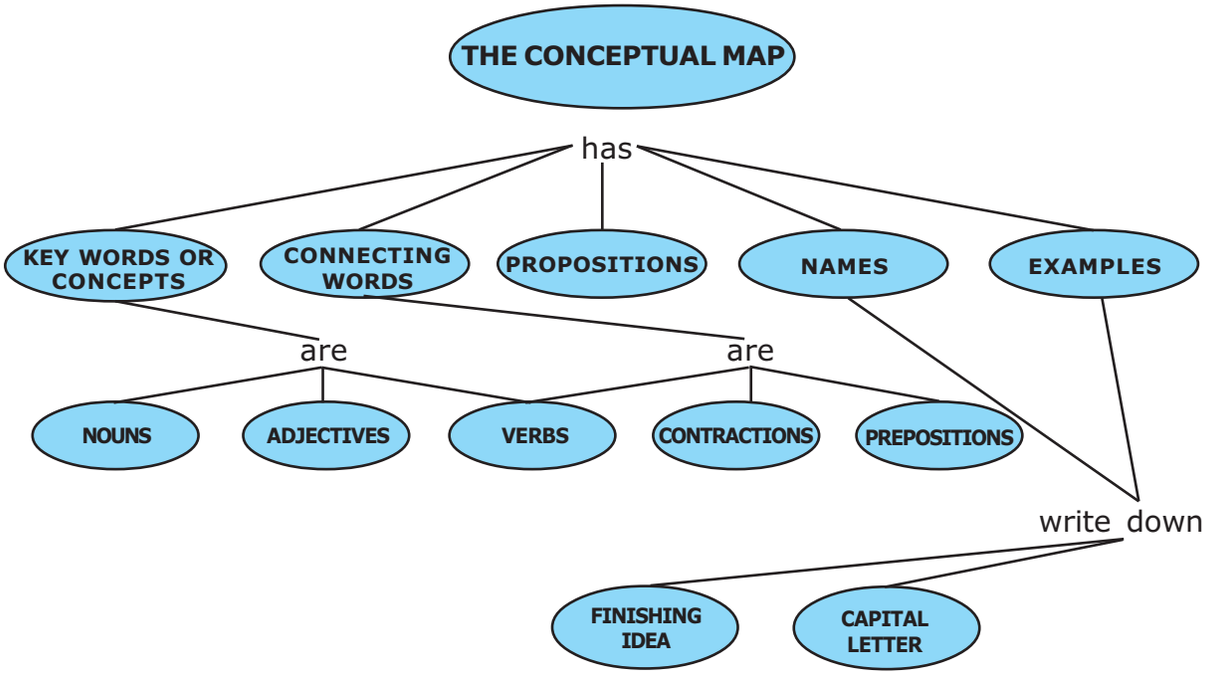
Map number 4



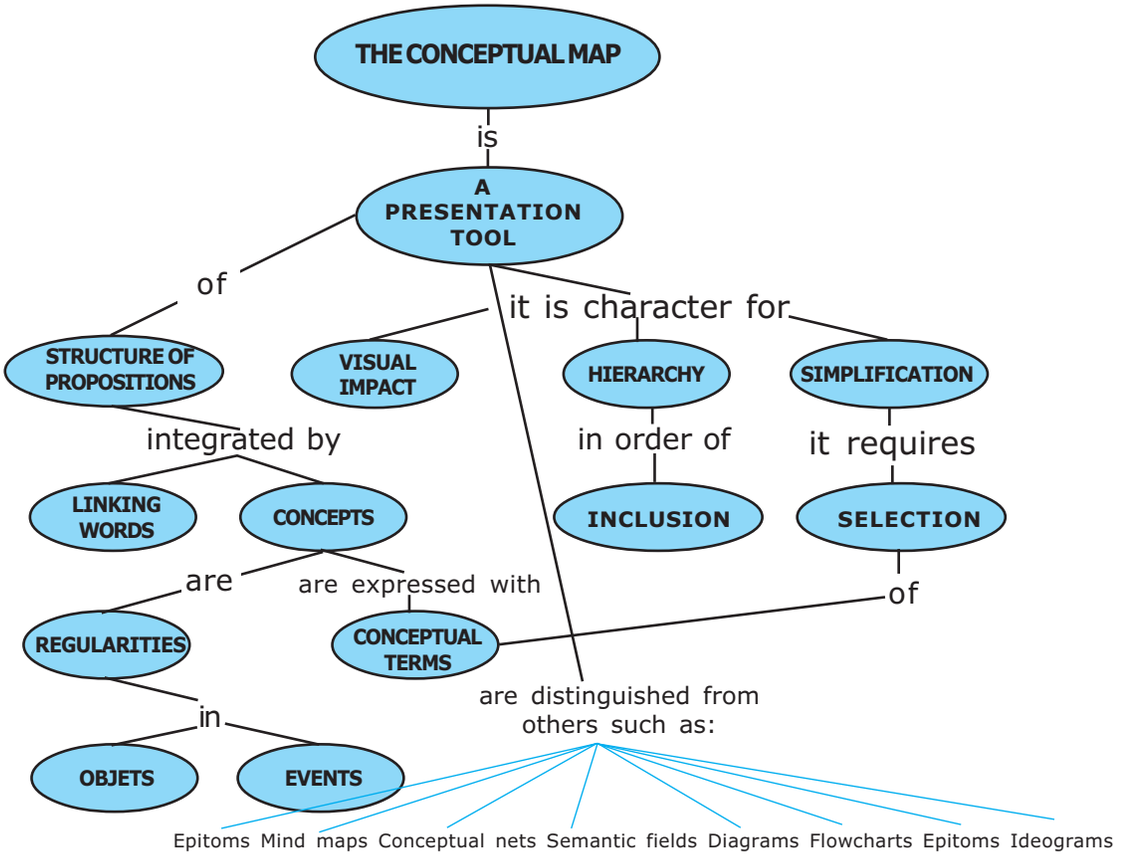
Map number 5



Map number 6



Map number 7



FINDINGS FROM THE ELABORATION OF CONCEPTUAL MAPS

The participants (higher education teachers) built strategies that allowed them the development of didactic material with a cognitive approach based on conceptual maps. They detected the major problems that affected students' reading comprehension of academic texts and in order to deal with them.

In the following pages, we shall report some of the experiences undergone by the participants while dealing with conceptual maps:

Before the experience	At the end of the experience
Summarizing, the following is a list of the main difficulties found into the higher educational classrooms: - Students do not identify mains ideas in texts - Students have difficulties to differentiate principal and secondary ideas. - Teachers are constantly complaining about the low level of reading comprehension. - Students do not show any interest in the presentation of their papers: lack of creativity, most students follows similar patterns in the presentation of their papers. - Students do not show interest in the academic texts that teachers previously have selected for the classes. - The scarce vocabulary evidenced in specific subjects and the lack of motivation to get more information - Strategies that teachers are implementing are not effective, and it is basically because most of them are not related with student's expectations, necessities, and interests. - Students do not manage reading comprehension methods. - Teachers and students do not organize their knowledge in a way that facilitates understanding, retrieval and application. - Students are often unable to apply their knowledge to situations differing from those studied in class. - Teachers and students start by underlining titles, subheadings and key words that seem to be the most important of those that represent the text and to emphasize which ones need to be remembered. - Students locate relevant information from the academic text by using techniques such as underlining or coloring. - They believe that the color (usually red color) makes their notes look more attractive and also gives them a stronger impression of the key word or phrase they had underlined.	- Students asked for new methodologies, strategies and techniques, and they claimed for effective reading habits that provide them a better understanding of the world and a more successful learning. - They applied conceptual maps for considering them useful as a way to solve specific problems into the classroom related to reading comprehension activities and learning processes. - At the beginning, the process was very slow and quite difficult due to the scarce knowledge of reading comprehension strategies. Fortunately, at the end of the experience, things became better and the participants seemed to be more interested and motivated when they began to understand how to use the conceptual maps. - The participants changed into a positive way, the class atmosphere was more collaborative and they were focused on their work, ready to share their opinions, materials, and knowledge. - Teachers and students found conceptual maps to be a more helpful technique than those used before the experience. - This experience using conceptual maps stressed the strategies enabling readers to construct meaning from academic texts. - When teachers and students are trained in conceptual maps they make significant gains in reading academic texts. - Teachers who are trained in these strategies could help their students achieve increased levels of comprehension. - Teachers found some advantages of mapping in academic texts: "Teachers could add information as fast as they could "They were able to think, organize, write and produce complete documents on academic subjects.

- Note-taking seems to be the essence of the information. - Before the examinations, students extract the key words and phrases, underline, and are able to condense a hundred pages of cards, charts, outlines, quotations and schemes. They are also able to locate the information from condensed notes. - Teachers and students' notes are extensive and linear as a result of a monotone reading.	"They were able to add colors to words or branches, to show connections. "Connections could be shown with easily drawn colored arrows. "Conceptual maps had a professional look to teachers and students. - The participants noticed important changes: a) improvement in the presentation of exams; b) the students were more focused during the activities; c) they followed instructions for solving exercises; d) they answered and formulated questions according to the topic; e) they felt comfortable in class; f) they wasted less time during the exercises; g) they participated more actively in class; h) they were very motivated; i) they understood the instructions easier; j) they presented more complete tasks; k) they worked in a collaborative environment sharing their productions; l) finally, they looked for a better place to study.

PARTICIPANTS' TESTIMONIES

"Initially I used outlines, but after the conceptual map experience it has been my tool. These maps enable me to present an overview of a subject both conceptually and then into small detail".

"For sometime now I have been mapping my ideas. Here are a couple of my maps. It is a piece of art".

"In the university the complexity and volume of work increase every day, and I began to face another crisis. I found myself sitting in the library, confronted with books, cards, photocopies, loads of notes made during the class and from the academic texts. Fortunately, I learned how to design conceptual maps."

"The conceptual map was quite a challenge. Participation and enthusiasm was greater than usual, the level of discussion was quite high, and my notes came up with different, inventive, and meaningful schemas".

"In fact, this semester I adopted the conceptual map for my class. Using my index cards; it was their most successful and fun activity. I have discovered that conceptual maps are helpful for teaching. This semester, I am instructing a thesis work and have encouraged the young researcher to draw conceptual maps to complement their outlines as a non-linear way to organize and clarify the amount of data collected from the fieldnotes."

"Not only have these maps helped me understand and refine my outlines, but the students report that the mapping process was a helpful study technique. Thus, the conceptual map is a flexible and powerful tool for integrating the various components of learning into one coherent and enjoyable activity".

"Teaching teenagers to read involves more that helping to recognize the combinations of sounds and letters that make up individual words. Helping them to understand the meaning of words, alone and in combination, is a no less critical part of the process".

CONCLUSIONS

After a thorough review of the process, the authors can conclude that:

Doing conceptual maps leads to increase vocabulary and key words. There is a high correlation between vocabulary and reading comprehension. Understanding academic texts at the university is a problem very much related to our daily teaching process that involves more than helping teachers and students to understand the meaning of words, alone and in combination; it was a critical part of the process.

The experience has shown that the conceptual maps are a tool for teachers, to get the hard core of the topic, and for students, to evolve from a sequence of notions and rules to a well organized content taken from academic texts.

Doing conceptual maps improved the reading comprehension ability. This experience also was an opportunity to share our findings according to the results that can generate an interesting starting point in terms of reading comprehension inside the university classroom.

Conceptual maps are pedagogical tools that help students structure their learning in useful ways. The teachers and students that experienced the mapping tools of didactics found that conceptual maps are a collaborative learning support strategy for learning.

Conceptual maps are useful for meaningful learning in higher educational environments. Participants considered how to refine reading habits by using the conceptual map for a more cognitive and constructive learning support.

Conceptual maps were used extensively to communicate ideas, help students see the relationships among concepts, and problem solving, as well as connecting basic scientific and pedagogical principles in learning activities.

The experience helped not only to improve the reading comprehension process in students but also to make teachers reflect on their performance into the classroom making them aware of the possibility to apply conceptual maps techniques in academic texts.

Conceptual maps facilitate a better understanding between teachers and students. The conceptual map is useful for teachers and learners to understand related concepts.

It is proposed the usage of conceptual maps as a cognitive strategy for acquisition and representation of knowledge. The experience using the conceptual map considered the following learning styles: 1. Recognition of participant's understanding after the academic session; 2. While teachers and students are creating the map on academic texts, they build knowledge and deepen their own; 3. After creating a conceptual map on academic texts, teachers and students know and agree a difference of thinking to a concept or knowledge of each other.

The role that plays the brain in the acquisition of knowledge is very important and the effectiveness or significance of it depends on its correct working. Through specially designed activities or strategies University teachers can stimulate that part of the brain involved in comprehending academic texts. The strategies applied had a positive impact in the students learning and in the teachers' teaching.

We conclude that this kind of work by doing conceptual maps is sometimes exhausting and it is required of people who are really engaged with the improvement of education and the well-being of this special generation, people who do not give up easily and expect to be better every day.

As a final conclusion, we can say that - in our experiences doing conceptual maps - it is a pedagogical tool that has made the learning process more attractive, faster and long-lasting.

Conceptual maps are activities that stimulate the students' brain to become more receptive and focused and in that way make the teaching-learning process more effective and everlasting.

Here, we, as university professors present our work about conceptual maps wanting to share it with all those who want to implement it as a methodological strategy in the sense of showing a pathway, and not only as the best way; but also as a good technique with which students can improve their reading comprehension of academic texts.

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